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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/872,770	06/01/2001	Subhash Narang	SRI-107/US	1227

7590 05/18/2005

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EXAMINER

RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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mm**Office Action Summary**

Application No.

09/872,770

Applicant(s)

NARANG ET AL.

Examiner

Mark Ruthkosky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-12 and 35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-9, 11, 12 and 35 is/are rejected.
- 7) ☐ Claim(s) 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Docket Number

The examiner has requested that the docket number of the application be changed according to the applicant's request.

Specification

The title of the invention has been amended to "Polymer Electrolyte Having Acidic, Basic and Elastomeric Subunits." This title is clearly indicative of the invention to which the claims are directed.

Election/Restrictions

Applicant's election of species II, claims 1-3, 5-12 and 35, as amended, and the corresponding species in the reply filed on 2/14/2005 is acknowledged.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 5 depends from claim 4, which has been canceled by the applicant.

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Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 8 recites the limitation "said elastomeric copolymer," however there is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The rejection of claims 1, 2, 4, 5, 6 and 11-12 under 35 U.S.C. 102(e) as being anticipated by Fenton et al. (US 6,465,136) has been overcome by the applicant's amendment.

The rejection of claims 1, 2, 4, 6, 7, 8 and 11-12 under 35 U.S.C. 102(e) as being anticipated by Wu et al. (US 6,214,251) has been overcome by the applicant's amendment.

The rejection of claims 1, 2, 4, 5, 6 and 11-12 under 35 U.S.C. 102(e) as being anticipated by Narang et al. (US 6,248,480) has been overcome by the applicant's amendment.

The rejection of claims 1, 2, 4, 6, 7 and 8 under 35 U.S.C. 102(b) as being anticipated by Tagoshi et al. (EP 900,834) has been overcome by the applicant's amendment.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-9, 11-12 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuer et al. (US 6,264,857 and WO 98/07164), in view of Abraham et al. (US 5,219,679), and further in view of Peer (EP 337,626.)

The instant claims are to a polymer electrolyte membrane comprising a first polymer comprising acidic subunits and a second polymer comprising basic subunits, wherein the polymer membrane further comprises an elastomeric polymer comprising elastomeric subunits and wherein the basic subunits comprise vinylimidazole.

Kreuer (the discussion of the rejection cites relevant passages in US 6,264,857) teaches a polymer electrolyte membrane comprising a first polymer comprising acidic subunits and a second polymer comprising basic subunits (cols. 1-2, for example.) The first polymer may be sulfonated polyether ketones, such as sulphonated polyetheretherketone, PEEK, with sulfonic, phosphoric and carboxylic acid groups (col. 2, lines 25-67; examples.) The basic subunits comprise polymers including vinylimidazole (col. 3, lines 40-50; examples.) The polymer electrolytes have a conductivity on the order of $\geq 10^{-3}$ S/cm (col. 4, lines 53-end; examples 1-4.) As the membrane is made of the same materials and taught to be useful in fuel cells, it will be substantially impermeable to methanol.

Kreuer does not teach that the polymer membrane further comprises an elastomeric polymer. Abraham et al. (US 5,219,679), however teaches the use of polyacrylonitrile (PAN) in a polymer electrolyte membrane in order to promote ionic conductivity, as the donor -CN- group of the polyacrylonitrile can complex with positive ions, such as lithium salts in an electrolyte. In addition, Peer (EP 337,626), teaches a polymer membrane comprising a blend of sulphonated polyetheretherketone and an elastomer including polyacrylonitrile (PAN.) The membranes have improved hydrophilic properties while being prepared from relatively hydrophobic polymers. It would be obvious to one of ordinary skill in the art at the time the invention was made to include polyacrylonitrile in the polymer mixture of Kreuer, as the skilled artisan will recognize, based on the teachings of the prior art, that polyacrylonitrile will provide a means for improved ionic conductivity and hydrophilicity in a polymer electrolyte membrane. As polymer electrolytes are used in batteries and fuel cells, the ionic conductivity of the membrane is critical to the transfer of ions in the battery or fuel cell. Abraham et al. (US 5,219,679), however teaches the use of polyacrylonitrile (PAN) in a polymer electrolyte membrane in order to promote ionic conductivity for positively charged salts. Peer (EP 337,626), teaches that polymer membranes comprising a blend of sulphonated polyetheretherketone and a polyacrylonitrile (PAN) have improved hydrophilic properties which is desirable for the transfer of protons in a fuel cell. Thus one of ordinary skill in the art would recognize from the teachings of Abraham et al. (US 5,219,679) and Peer (EP 337,626), that adding polyacrylonitrile to the polymer electrolyte of Kreuer will offer improved ionic conductivity in a polymer electrolyte. The artisan would have found the claimed invention to be obvious in light of the teachings of the references.

Allowable Subject Matter

Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The instant claim is to a polymer electrolyte membrane including a second polymer comprising polyvinylimidazole and wherein said acidic subunits comprise 2-acrylonamide-2-methyl-1-propane sulfonic acid and elastomeric subunits comprise acrylonitrile. The prior art does not teach a polymer electrolyte membrane including a combination of these materials, as claimed. As such, this claim is allowable over the prior art.

Response to Arguments

Applicant's arguments with respect to claims 1-3, 5-13 and 35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky

Primary Patent Examiner

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Mark Ruthkosky
5/14/05